REMARKS

Status of the Application

Claims 1, 5-17, and 19-22 are all the claims in the application. Claim 1 has been amended for clarity. No new subject matter has been added.

The Office Action

Claims 1, 5, 9-11, 16, 17, and 19 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamada (US 6,608,330) in view of Sasaoka (US 2003/0042496) and Stintz (US 2002/0114367).

Claims 6-8 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamada, Sasaoka, and Stintz, and further in view of Hanaoka (US 5,804,839).

Claims 12, 13, and 15 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamada, Sasaoka, and Stintz, and further in view of Morita (US 6,121,636).

Claim 14 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamada, Sasaoka, and Stintz, and in further view of Kaneyama (US 6,452,214).

Claim Rejections under 35 U.S.C. § 103

A. Claims 1, 5, 9-11, 16, 17, and 19 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamada in view of Sasaoka and Stintz.

Claim 1 recites among other elements: "all of the individual gallium nitride compound semiconductor well layers of the light-emitting device each has the same composition."

Applicants respectfully submit that Yamada does not teach "all of the individual gallium nitride compound semiconductor well layers of the light-emitting device each has the same composition." Yamada clearly teaches a well layer 109 having a composition different from that of well layers 107 and 108, as discussed in detail below.

Applicants respectfully maintain that the Examiner's characterization of Yamada that "the structure of the multiple quantum well may be considered to comprise layers 107 and 108, and need NOT include layer 109" is incorrect.

Yamada discloses, at Col. 2 lines 1-7, a light emitting device having a first well layer (108) and a second well layer (109) which clearly differ in In composition. That is, the light

emitting device Yamada requires the well layers to have different composition. According to Yamada, in case of an active layer having a multiple quantum well structure including well layers having different luminous peak wavelengths, the degree of asperity of the well layer is effective for decreasing the absorption of light and improving the luminous efficiency. Further, the asperity of the second well layer (109) is more important, as Yamada discloses that the degree of asperity of the second well layer can be optimized to improve the luminous efficiency of the second well layer. The Examiner therefore can not reasonably conclude that the well layer of Yamada can be interpreted not to comprise the second well layer 109 where Yamada emphasizes both interaction of the first and second well layer and the importance of the second well layer in achieving Yamada's objectives.

The multiple quantum well structure of Yamada comprises all of the layers 107, 108 and 109. Further, the light emitting device of Yamada has a first well layer (108) and a second well layer (109) that differ in In composition. The Examiner's contention that the multiple quantum well structure of Yamada only consists of the layers 107 and 108 is contrary to the teachings of Yamada, and such a multiple quantum well structure would not satisfy the fundamental technical concept of the invention according to Yamada.

According to Yamada, in order to form a light-emitting device having high luminous intensity and high luminous efficiency, the first well layer 108 and the second well layer 109 need to be made from different compositions (column 8, lines 8-28).

Yamada discloses that the In content in the well layer included in the multiple quantum well structure is closely related to the degree of asperity of the well layer, which exerts influence on the device characteristics, and on the other hand, the degree of asperity gives different influence to the luminous efficiency (column 5, lines 27-43). The object of Yamada is to provide a light source having desired color rendering property due to the cooperative effects of the first well layer 108 and the second well layer 109, each being different in the In composition and the degree of asperity (column 5, lines 54-58). That is, Yamada describes that the asperity of the well layer is effective to the device characteristics in case that the first well layer (108) is different from the second well layer (109) in the In composition.

To the contrary, as claimed, each and all of the individual gallium nitride compound semiconductor well layers have the same composition. Yamada clearly teaches a well layer 109

having a composition different from that of well layers 107 and 108. Yamada does not teach or suggest all of the well layers to have the same composition, as claimed.

Additionally, the Examiner asserts that it is common in the art that layers may comprise sub-layers, and that a sub-layer may also be referred to as a layer. The Examiner contends that **Stintz** shows in Figure 11C that the quantum well layer 408 is discontinuous and has portions of zero thickness. The Examiner took the position that he has not substituted the entire quantum well structure of Stintz into the quantum well structure of Yamada, but rather has *used Stintz as a supporting reference to show that it is indeed advantageous to have a discontinuous well layer (sublayer) within the quantum well structure.* (*See* Office Action, page 20.)

The Examiner stated that the layer 406 and the protruding portions 1105 of Stintz (as shown in Fig. 11C) are not relied upon for the present rejection, but rather he only relies upon the discontinuous well layer 408.

Contrary to the Examiner's assertion, there is no description or teaching in Stintz that it is advantageous to have a discontinuous well layer (sublayer) within the quantum well structure. Stintz simply states that it is not preferable for the well layer to have asperity on the surface in contact with the barrier layer, and it is preferable for the well layer to have a substantially planar surface in contact with the barrier layer (paragraph [0081] and FIG. 11C). In the quantum well structure shown in Fig. 11C of Stintz, the protruding portions 1105 are removed such that the upper well layer 408 has a substantially planar surface.

Sasaoka does not cure any above-discussed deficiency of Yamada and Stintz.

Accordingly, Applicants respectfully submit that the Examiner's proposed combination does not teach or suggest at least: "all of the individual gallium nitride compound semiconductor well layers of the light-emitting device each has the same composition …; … wherein the at least one gallium nitride compound semiconductor well layer is a discontinuous layer including a portion having a thickness of 0 nm."

It is, therefore, respectfully submitted that **claim 1 and dependent claims 5, 9-11, 16, 17, and 19** are patentable.

B. Claims 6-8 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamada, Sasaoka, Stintz, and Hanaoka.

Claims 12, 13, and 15 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamada, Sasaoka, Stintz, and Morita.

Claim 14 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamada, Sasaoka, Stintz, and Kaneyama.

Claims 6-8 and 12-15 depend on claim 1. As discussed above, Yamada, Sasaoka, and Stintz do not teach all of the features of claim 1. Neither Hanaoka, Morita, nor Kaneyama cures any above-discussed deficiency of these references. It is, therefore, respectfully submitted that **claims 6-8 and 12-15** are patentable at least by virtue of their dependencies.

CONCLUSION

Withdrawal of all rejections and allowance of claims 1, 5-17, and 19-22 are earnestly solicited. In the event that the Examiner believes that it may be helpful to advance the prosecution of this application, the Examiner is invited to contact the undersigned at the local Washington, D.C. telephone number indicated below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

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Date: November 24, 2010